Sediment Issues

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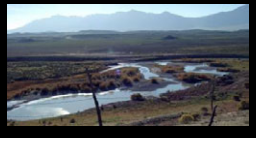
SEDIMENT – What Are We Talking About?

- Suspended Solids in the ***water column***
  - Total suspended solids
  - Turbidity
  - Water clarity/secchi depth
- Sediment on the ***stream bottom***
  - Embedded sediments/siltation
  - Bedload sediment
  - Surface/subsurface sediment
- Sediment supply, transport, and balance ***within the stream***
  - Location of sediment
  - Accumulation or loss of sediment
  - Movement of sediment

Why Are We Concerned About Sediment?

- Impacts to recreational uses
- Impacts to agricultural uses
- Impacts to drinking water uses
- Impacts to fish and aquatic life



What Are the Current Sediment Standards?

- Sediment is ***HIGHLY VARIABLE***, and therefore most sediment standards are ***narrative*** and contained in multiple "rules"
  - Prevent "harm" to fish and aquatic life
  - X increase allowed over "naturally occurring" or background levels
    - This is usually for point source discharges
- Some states or tribes have numeric TSS standards
- Some states/tribes moving towards stream bottom or geomorphic standards
- Also more biological standards appearing

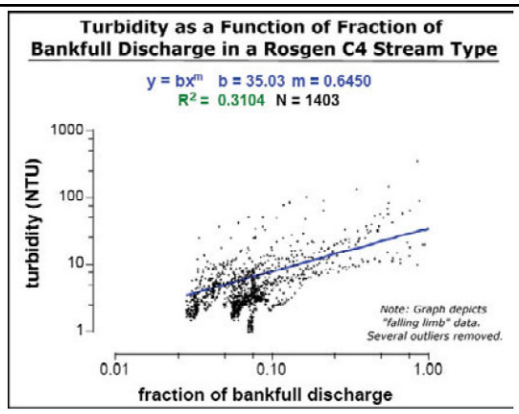
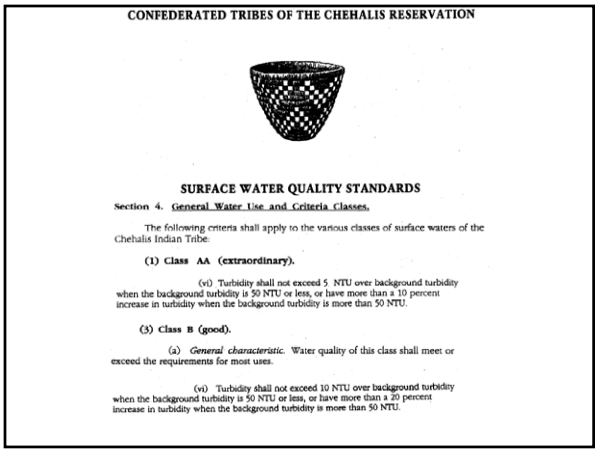


Figure 1. Example of VDOF reference stream data.



CONFEDERATED TRIBES OF THE CHEHALIS RESERVATION

SURFACE WATER QUALITY STANDARDS

Section 4. General Water Use and Criteria Classes.

The following criteria shall apply to the various classes of surface waters of the Chehalis Indian Tribe:

(1) Class AA (extraordinary).

(vi) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(3) Class B (good).

(a) *General characteristic.* Water quality of this class shall meet or exceed the requirements for most uses.

(vi) Turbidity shall not exceed 10 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

§ 131.35 Colville Confederated Tribes Indian Reservation.

The water quality standards applicable to the waters within the Colville Indian Reservation, located in the State of Washington.

(1) *Class I (Extraordinary)*—(i) *Designated uses.* The designated uses include, but are not limited to, the following:

(A) Water supply (domestic, industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation.

(F) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

Water Quality Standards Applicable to waters within the Kalispel Indian Reservation

12(a) Brown Trout Spawning

These criteria shall apply between October 1 and March 1 although site-specific designations may apply at other times.

3) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10% increase in turbidity when the background turbidity is more than 50 NTU.

12(d) Agricultural Water Supply

These criteria apply to source waters at the initial point of diversion from Waters of the Reservation and do not apply within systems designed for drainage water reuse.

5) Total suspended solids shall not exceed 75 milligrams/liter.

Idaho

250. SURFACE WATER QUALITY CRITERIA FOR AQUATIC LIFE USE DESIGNATIONS.

e. Turbidity, below any applicable mixing zone set by the Department, shall not exceed background turbidity by more than fifty (50) NTU instantaneously or more than twenty-five (25) NTU for more than ten (10) consecutive days. (8-24-94)

Chapter 173-201A WAC

WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF WASHINGTON

(vi) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION OF OREGON

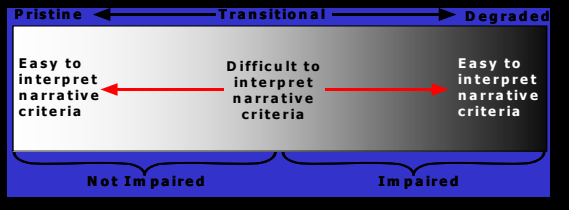
WATER QUALITY STANDARDS, BENEFICIAL USES. AND TREATMENT CRITERIA

d) Turbidity (Nephelometric Turbidity Units, NTU)

(1) Shall not be at a level to potentially impair designated beneficial uses or aquatic biota.

Narrative Sediment Standards

- Narrative standards can be difficult to interpret
  - Might need to provide numeric endpoints
- What does "background level", "natural condition", and/or "harmful impacts" mean???



Interpretation of Narrative Sediment Standards

- There is no "magic number" or "cookbook" to help interpret the narrative standards.
- Sediment indicators, criteria, or targets are needed to determine sediment impairment and/or measure success of BMPs

Sediment Indicators/Criteria/Targets

- Multiple indicators are used throughout the U.S.
- Indicators vary based on ecoregion, precipitation, soils, geology, etc.
- Tools to detect sediment impacts are further refined for mountain streams than the plains where the natural sediment load is large.

Water Column Measurements
Total Suspended Solids (TSS)
Suspended Sediment Concentration (SSC)
Turbidity
Secchi Depth

Bank Condition
Presence/Absence of Bank Erosion
Quantified Extent of Bank Erosion (linear feet, percent of reach, etc.)
Quantified Bank Erosion Load
Bank Angle/Frequency of Undercuts
BEHI
Bank Stability

Stream Channel Condition
Large Woody Debris (LWD)
Riffle Stability Index (RSI)
Width to Depth (W/D) Ratio
Entrenchment Ratio
Sinuosity
Bank full Width
Pool Frequency
Residual Pool Depth
Residual Pool Volume (V*)
Relative Bed Stability
Channel Alterations

Stream Bottom Substrate
% Surface Fines < 2 mm
% Subsurface Fines < 6.35 mm
% Subsurface Fines < 0.85 mm
Substrate Score
Embeddedness
D50
Particle Distribution Curves

Presence/Absence of Sources
Soils/ Geology
Number of Dams/Diversions/ Reservoirs/Other Flow Alterations
Agriculture (Amount/ Type)
Grazing Density/ Animal Unit Month
Stream Crossings
Fire
Timber Harvest History
Equivalent Clear-cut Area (ECA)
Water Yield Increase
Culverts/ Culvert Failure Rate
Road Density
Riparian Road Density
Mining history, type, and extent

Total Suspended Solids / Turbidity

- Everyone's favorite sediment indicator
- Easy to measure
- Can be used to calculate loads.
- Direct linkage to fish and aquatic life impairment (abrasion, altered feeding, etc.)
- TSS data collected at an upstream/downstream site or a reference site can be used for comparison. Also historical versus current data.

Total Suspended Solids / Turbidity

- Ideally, you would have a robust TSS or turbidity dataset that provides adequate temporal and spatial coverage and incorporates ***storm event sampling***.
- Storm event sampling is difficult to capture, but necessary
- USFS found that you need HUNDREDS of samples to determine a ***statistically significant*** change in TSS!
- Results from a single TSS sample have ***limited*** application.
- Doesn't provide any indication about natural versus anthropogenic sources

Sources

- Sources and/or source loads can be used as sediment targets
  - Bank Erosion
  - Road Density
  - Harvest History
  - Riparian cover/stability
  - Etc…

- Target/criteria/indicator can be a % improvement, reduction in load, increase in riparian cover, etc

Sources

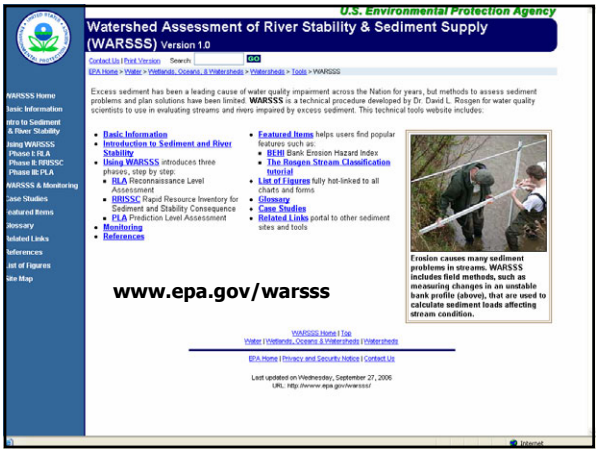
- Sources provide an indication of natural versus anthropogenic sediment
- Sources are a necessary indicator because you can't have an impairment without an anthropogenic source
- Doesn't provide a linkage to aquatic life impairment
- ***Use in conjunction with other indicators***

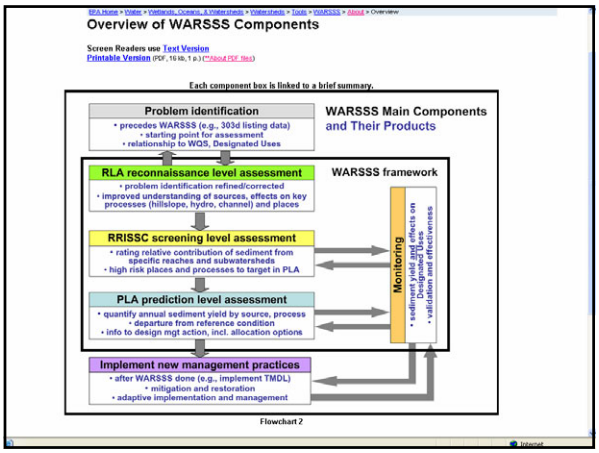
Biological Indicators

- Use biological measures to determine whether the aquatic life use is supported
  - Multimetric indices
  - Predictive models
- Defensible diagnostic tools to help discern sediment impacts are under development
  - Individual metrics
  - Sediment-specific tolerance values

Summary: Determining Sediment Impairment

1. What are your goals/expectations?
2. What data do you have?
3. Do you have time, money, and the need to collect more data?
4. Based on the data available to you, your region, stream characteristics, etc, pick a ***suite of indicators/criteria*** that is right for your stream
5. Assess the ***weight of evidence*** to determine sediment impairment or improvement




EPA Home > Water > Wetlands, Oceans, & Watersheds > Watersheds > Tools > WARSSS > About > Overview
Overview of WARSSS Components
Screen Readers use Text Version
Printable Version (PDF, 16 kb, 1 p.) (*About PDF files)
Each component box is linked to a brief summary.
Problem identification
• precedes WARSSS (e.g., 303d listing data)
• starting point for assessment
• relationship to WQS, Designated Uses
WARSSS Main Components and Their Products
WARSSS framework
RLA reconnaissance level assessment
• problem identification refined/corrected
• improved understanding of sources, effects on key processes (hillslope, hydro, channel) and places
RRISSC screening level assessment
• rating relative contribution of sediment from specific reaches and subwatersheds
• high risk places and processes to target in PLA
PLA prediction level assessment
• quantify annual sediment yield by source, process
• departure from reference condition
• info to design mgt action, incl. allocation options
Monitoring
• sediment yield and effects on Designated Uses
• validation and effectiveness
Implement new management practices
• after WARSSS done (e.g., implement TMDL)
• mitigation and restoration
• adaptive implementation and management
Flowchart 2
Internet